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Climate Change Agreement (CCA) for Data Centres

Target Period Two: Report on Findings

September 2017

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Foreword

The Climate Change Agreement for data centres is now well established: the sector has successfully navigated its first two efficiency targets and operators are already working towards their third milestone on the way to their final 2020 target.

I am delighted that the sector achieved its very challenging second target and it is clear that the scheme continues to improve energy efficiency whilst protecting jobs and growth. A bespoke approach has obvious advantages.

This report sets out our progress against our second target, which I am very pleased to share with you on behalf of the UK Council of Data Centre Operators.

Andrew Jay, Chairman, UK Council of Data Centre Operators

We have all learned a lot on our CCA journey: greater transparency is improving our understanding of energy stewardship within the sector. The robust and auditable data generated by the scheme gives us invaluable insight on the energy consumption of the UK's commercial data centre market and is enabling me to dispel a number of unhelpful but long-lived myths about sector energy use, a task that I am rather enjoying.

Most importantly we are seeing a change in the way that policy makers perceive our sector: a growing recognition that data centres are part of our core infrastructure, underpinning the UK's digital economy, stimulating growth and competitiveness. Admittedly we still have a long way to go before Government explicitly acknowledges the role our facilities play but we will continue to travel hopefully: indeed, it is the only way to travel.

Emma Fryer, Associate Director, techUK

The sector has really engaged with its Climate Change Agreement and it is pleasing to see how well the companies have performed in Target Period 2. This improvement in energy efficiency is a credit to the staff who continuously look to implement changes that can reduce their energy consumption and hence carbon emissions.

Companies are looking for stability in their operational costs at this uncertain time. The CCA plays an important part in creating better business cases for investment in UK operations. As policies change we hope this policy is here to stay for the long term.

Julie Gartside, Operations Manager, SLR Consulting

Executive Summary

A Climate Change Agreement (CCA) is a voluntary scheme with the dual purpose of protecting energy intensive sectors subject to overseas competition and driving improvements in energy efficiency within those sectors. Participants are eligible for reductions in, or exemption from, some carbon taxes but in return they must meet efficiency targets. The CCA scheme has been in place since 2001, its second phase started at the beginning of 2013 and runs until 2023. Targets for participants are split into milestones: 2013-14, 2015-16, 2017-18 and 2019-20. The data centre CCA started in July 2014. 98 sites registered immediately and reported progress against the first target milestone at the end of 2014. A further 31 joined the scheme during the second period so 129 sites have reported progress against the second target.

Progress against target: facts and figures

The sector target for data centres is a 15% reduction in PUE by 2020, although this is subject to review. The sector successfully achieved its 2014 target, a modest 1% reduction to reflect the fact that sites joined the scheme almost at the end of the first target period so had little time to implement measures. The second target was a much more challenging 8.33% and although the sector achieved this target as a whole, reducing PUE by just over 10% (from 1.959 to 1.797), the picture among individual operators was mixed. At site level (129 sites) 37 sites failed and 92 sites passed. At Target Unit (TU) level (the sites make up 54 TUs - operators can bubble sites together into a single TU and then offset savings between sites), 27 TUs passed the target milestone and 27 TUs failed. Buyout fees ranged from under £1,000 to just under £200,000. Total buyout was £988,236. All facilities that failed chose to remain in the scheme by buying out carbon to make up the shortfall. In general, failures were the result of a decrease in the ratio of throughput to baseload.

Energy consumption and carbon impacts

The CCA gives us invaluable data on the energy used by the UK's commercial data centre sector. In fact the UK may be the only country where sector energy consumption is measured using auditable data in this way – elsewhere energy use tends to be estimated or modelled. The 129 facilities in the scheme collectively consumed 2.57TWh of electricity in 2016 which equates to 0.76% of the 339TWh of electricity generated in the UK that year[1]. In terms of primary energy (the fuel needed to generate the electricity consumed) the figure for 2016 is 6.67TWh, which amounts to 0.28% of the UK's total primary energy supply of 2339TWh. In terms of carbon impacts the emissions generated by the sector in 2016 were 1264KT CO_2e (CO_2 equivalent). This calculation is based on the assumption that all electricity purchased has a grid average carbon impact. In reality many operators purchase green energy.

Scheme benefits

The CCA continues to provide a range of benefits to the sector. The requirement to measure and report energy consumption in a robust, consistent and auditable way, including the obligation for all sites to implement sub-metering, has set a much higher standard for energy monitoring. PUE[2] is now being measured more consistently and appropriately. This has improved transparency and has given us a better understanding of the way the sector uses energy. The aggregate figures provide invaluable insight into sector energy demand and have already dispelled a number of myths about data centre energy use, which has previously been a subject of much poorly informed speculation. In many cases we are also seeing more open customer-supplier dialogue on energy to address the kind of split incentives that have historically occurred in landlord-lessee scenarios. CCA is the only UK policy instrument that collects site level energy data sector by sector.

[1] DUKES 2017: https://www.gov.uk/Government/uploads/system/uploads/attachment_data/file/637823/DUKES_2017.pdf

[2] PUE, or Power Usage Effectiveness is a measure of energy productivity widely applied to data centres. It is the ratio of energy delivered to the IT function divided by energy to the facility. The lower the PUE, the higher the energy productivity.

In terms of financial benefits, the scheme provides much needed relief from some of the more punitive non commodity costs currently added to the price of electricity. Across the sector this relief amounts to just over £21M per year, of which £12.1M is attributable to CCL discount and £8.9M to CRC exemption. Since changes to the rules regarding EU ETS have exempted all ETS sites from CRC, this figure excludes the CRC exemption conferred by the CCA on to the largest facilities as it has already been accounted for. Were that to be included the total annual benefit to the sector would approach £30M. It is hard to overstate the value of the CCA to the UK data centre sector. It helps to level the playing field for UK operators trying to compete with overseas counterparts, it improves the business case for investment in efficiency measures and releases funding that would previously have been allocated to paying carbon taxes so it can be directed at implementing improvements.

The future of the data centre CCA

Barring a dramatic change in policy direction, the CCL discount that the CCA enables will continue beyond the fourth target period and operators will enjoy CCL discount up until 2023 (CRC will be abolished in 2019 and the resultant increase in CCL will be offset by an increase in the discount from 90% to 93%). The scheme closes to new entrants from October 2018 which effectively imposes a June deadline for new applications. For mature industrial sectors that are not growing rapidly, or long established oligarchic industries where there is little change, this may not present an issue. However, the data centre sector is growing rapidly and new facilities are coming online all the time. Under the current proposals, there will be almost a five year period when new facilities will not have access to the CCL rebate, which places them at a competitive disadvantage. We think the current approach should be reviewed urgently. A better approach would be to extend the CCA for another ten years.

Wider policy landscape: New reporting framework

Brexit and the demise of measures like the CRC have major implications for carbon and energy taxation and reporting. The good news is that in real terms Government has a blank sheet in this area, so Treasury proposals to simplify energy taxes are extremely welcome. Implementing new frameworks may take some time, so in the meantime policy makers could improve confidence and competitiveness by making data centres eligible for the same energy cost compensation as other electro-intensive sectors, and seeking to exempt them from EU ETS.

The UK data centre sector continues to need strong signals of support because it is very energy intensive, highly vulnerable to overseas competition due to the mobility of digital data, and critically important to the UK economy. We are optimistic about the recent BEIS commitments to reduce energy costs for businesses, which are very welcome indeed, and look forward to engaging on what promises to be a fruitful policy dialogue.

How to use this report

This report should be read in conjunction with our two previous reports:

- Preliminary Report: November 2014

Climate change Agreement for Data centres: First Findings Report

- First Target Report: October 2015

Climate Change agreement (CCA) for Data Centres: Target Period One: Report on findings

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Further information: If you have queries regarding the content of this report, need further information or wish to know more about techUK's data centre programme then please contact Emma Fryer, Associate Director, techUK: emma.fryer@techuk.org

For technical queries or for other information relating to the CCA scheme please contact techUK@slrconsulting.com

I: Introduction

This section explains the scope and objectives of the report. It then provides a short definition of climate change agreements, a quick recap of where we are in the process, the target milestone we have just passed and how it was calculated.

Scope and objectives of this report

techUK initially reviewed the Climate Change Agreement for Data Centres in our CCA First Findings Report, published in November 2014, once the first cohort of participants had registered. That preliminary report explained the scheme, its processes and objectives and reviewed the experiences of the various stakeholders involved. It identified lessons learned from the process and made some preliminary comments on the wider implications of the scheme for the UK data centre sector.

That report was followed a year later by our second, published in October 2015 which set out how the sector performed against our first target milestone. The second report also explained the target setting process in some detail and how the sector target was amortised among the participants. It commented on the understanding we were gaining on our sector's energy use, on best practice, and on identifying and addressing barriers to implementing efficiency measures. It also made some broader policy observations on the effectiveness of the CCA.

This report, the third in our series, reviews sector performance against our more ambitious second milestone. While the sector as a whole passed its target the picture was more mixed for individual operators. The reasons for this are discussed. We then look ahead at the future of the CCA scheme and whether the current proposals will meet the needs of this rapidly growing sector. We also consider the wider policy agenda relating to the future of carbon taxation and energy efficiency, including the impacts of Brexit and scope for a new reporting framework to replace the duplication and complexity that businesses currently have to wrestle with.

Our intention is that the three reports, and any subsequent iterations, should be used interchangeably. Therefore, rather than duplicating large sections of text or detailed explanations between reports we have provided a simple cross referenced index in the section "how to use this report". This identifies which topics are covered by each of the reports.

Just a reminder.....er, what's a CCA?

Climate Change Agreements (CCAs) are negotiated arrangements between Government and energy intensive sectors. The objective is to improve energy stewardship without damaging growth. Over 50 industry sectors are covered and the scheme has been running since about 2001. In return for a reduction in, or exclusion from, paying some carbon 'taxes' (CCL and CRC), participants are given energy efficiency targets. These targets are sector-specific so they can be focused exactly where they can deliver the most benefit. Because CCAs accommodate growth by focusing on energy efficiency instead of net reductions, they are particularly suited to drive efficiency improvements in sectors like data centres that are energy intensive, growing fast, and vulnerable to overseas competition.

For data centres, the efficiency targets take the form of a reduction in PUE[3] : the exact reduction required for each site depends on current performance. The scheme runs until 2023 (see the timeline illustration below) and the reduction target is spread over four target periods. Although not perfect, PUE was chosen because it is well understood and measurable.

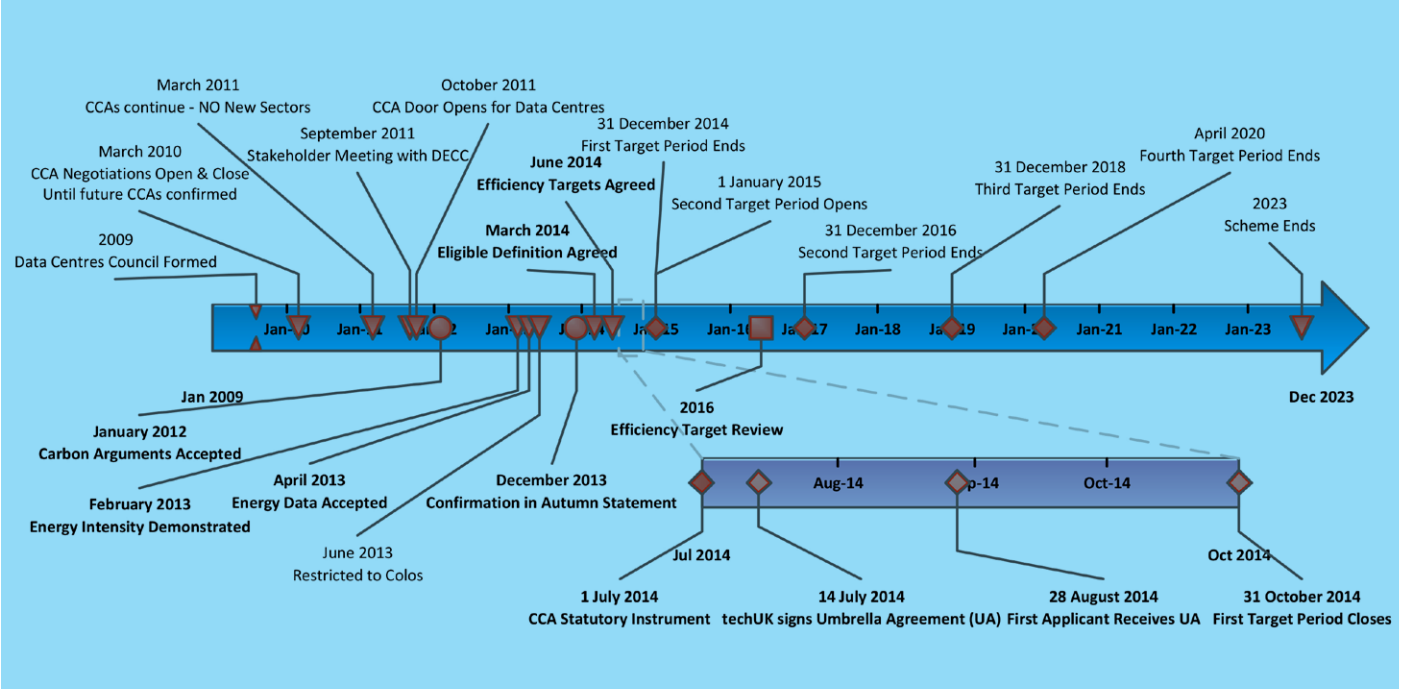
The scheme involves three main parties:

1) the Environment Agency (EA) administers and enforces it on behalf of BEIS (previously DECC),
2) techUK (the Association) acts on behalf of the sector, assisted by SLR Consulting, and
3) individual data centre operators join the scheme as participants.

[3] PUE or Power Usage Effectiveness (see note 1). For the data centre CCA the PUE is measured as total delivered energy (ie in KWh or MWh), divided by total energy to the IT, annualised.

Where are we in the process?

The CCA is a long term policy tool and we are in the third target period of the second phase of the scheme. The timeline below sets this out. The data centre sector joined the scheme near the end of the first target period of the second phase. The sector is now just over half way through the formal target periods but only about a third of the way through our involvement with the scheme.



What is our second target and how is it calculated?

Under competition law, a tax concession like the CCA can only be granted if the objectives of the tax are fulfilled in other ways, so in this case energy efficiency has to be improved by alternative means. To achieve this, participating CCA sectors are given efficiency targets. The data centre sector target has been agreed as a 15% reduction in PUE by 2020 over a 2011 baseline.

The sector target is broken down in two ways. Firstly it is divided over time; as mentioned above there are four target milestones, at the ends of 2014, 2016, 2018 and 2020 – (see below). Secondly it is amortised between all the participants who are given individual targets. The target setting process is tricky but important: the target needs to be high enough to drive ambition: if it is too low it will not change behaviour. On the other hand if it is set too high then companies will be unable to meet it and be penalised. The target also has to be shared between participants fairly without penalising early adopters. See p.12 of our Target 1 report for an explanation of how the target is amortised between participants on the basis of base year PUE.

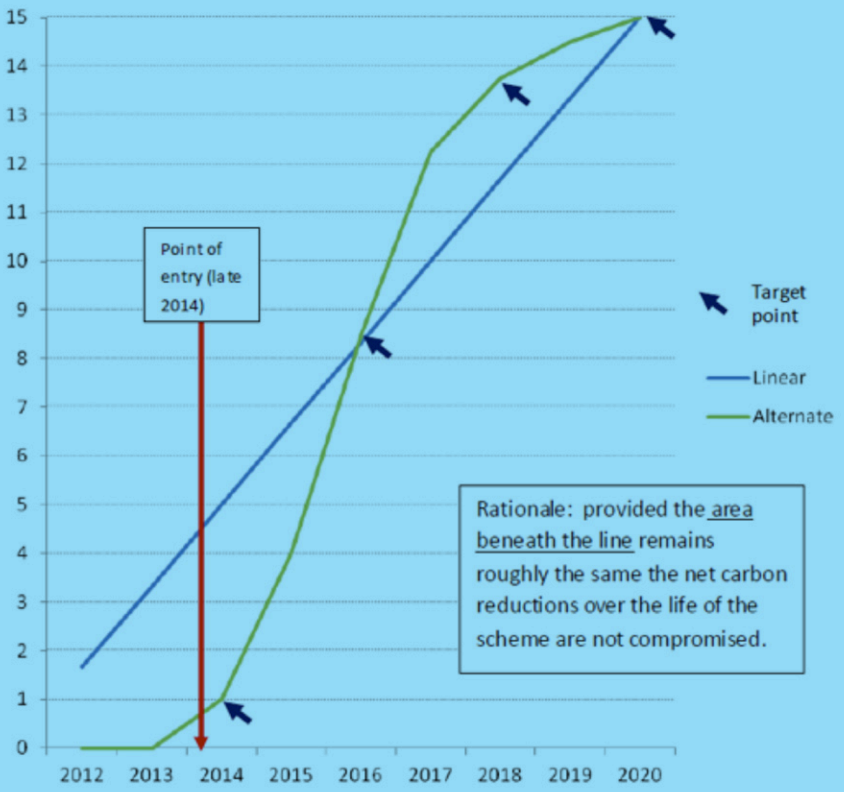
How the target is spread over the life of the scheme

Participants are obliged to meet milestone targets as well as the overall target. If they meet a target they can bank any excess carbon but if they fail a target they have to buy carbon to make up their shortfall if they want to stay in the scheme. The current carbon price is £12 per tonne but this will rise to £14 per tonne by the next milestone.

Our second milestone target was a reduction in PUE of 8.33%. This was challenging: we had been granted a concession on the first target which was reduced from 5% to 1% because we had joined the scheme late but in return we undertook to make up as much lost ground as we could by the second target. The chart below shows a normal target profile (blue line) compared to the one we negotiated (green line).

The sector was due to renegotiate its target during 2016 and indeed the negotiations started. We took the position that the target should remain unchanged or be reduced in the light of the uncertainties generated by Brexit. BEIS chose to leave the target unchanged because the data from the very short first target period was insufficient to inform the decision making process adequately.

Chart of Target Profile



See p.31 of our report on Target Period 1 for a more detailed explanation of the rationale behind this position.

Summary of data centre CCA target breakdown

- First target period: 1% (under a linear model this would have been 5%)
- Second target period: 8.33% (unchanged)
- Third target period: 13.75% (Under a linear model this would have been 11.67%)
- Fourth target period: 15% (unchanged)

II: Facts and Figures - Sector Performance Against Second Target

This section explains how we have performed against our second efficiency target at both sector level and at target unit (participant) level. It also provides basic facts and figures about the energy going through the scheme and participant numbers.

Participants

The CCA is split into four target periods, each of which represents a milestone en route to the 2020 target. Participants have to report progress against each target period. The second target period ended on 31st December 2016. Facilities that join the scheme during 2017 will not be included in this list because they have entered in the third reporting period and will not report until the next round. This means that the target period performance data published in this report covers 129 facilities from 57 target units, representing 42 companies.

The list of companies reporting at the second target milestone is as follows. Note that companies that have been subject to mergers and /or acquisitions during this period will be included in the listing as their sites will have submitted data for the relevant period.

Ark Data Centres Ltd	Knowledge Ltd
Atos IT Services UK Ltd	Level 3 Communications UK Ltd
CenturyLink Technology UK Ltd	Next Generation Data Ltd
Cogeco Peer 1 (UK) Ltd	Node4 Ltd
Colt Data Centre Services UK Ltd	Pulsant Ltd
CSC Computer Sciences Ltd	Rackspace Ltd
DataBanx Ltd (now Pulsant)	Six Degrees Technology Group Ltd
Datum DataCentres Ltd	Specialist Computer Centres Plc
Digital London Ltd	Sungard Availability Services (UK) Ltd
Digital Realty (UK) Ltd	Talk Talk Group
Eduserv	TATA Communications (UK) Ltd
Equinix (UK) Ltd	TelecityGroup UK Ltd
Everest Data Centres Ltd	Telehouse International Ltd
Fujitsu Services Ltd	Telstra Ltd
Global Switch Ltd	The Bunker Secure Hosting Ltd
Gyron Internet Ltd	Unisys Ltd
IBM United Kingdom Ltd	Virtus Ltd
Interoute Communications Ltd	Vocalink Ltd
Interxion Ltd	Vodafone Ltd
Iomart Hostings Ltd	Volta Datacentres Ltd
ISDC Developments Ltd (Infinity)	Zen Internet Ltd

Sector results: Vital statistics for operators reporting in TP2

The table below shows the figures for electricity use and the PUE. As shown, the sector consumed 2.573TWh of electricity per year, averaged over the two year target period. This is an increase of 0.4TWh over the previous target period but this reflects growth in the number of participants in the scheme and growth in participant activity. The 2.57TWh of electricity consumed by the 129 facilities in the scheme collectively equates to 0.76% of the 339TWh of electricity generated in the UK that year. In terms of primary energy (the fuel needed to generate the electricity consumed) the figure for 2016 is 6.68TWh, which amounts to 0.285% of the UK's total primary energy supply of 2339TWh.

	Base Year at TP1[4] (12 mths)	Target Period 1 (actual data)	Target Period 1[5] (normalised to 12 mths)	Base Year at TP2[4] (12 mths)	Target Period 2[6] (actual data)	Target Period 2[6] (normalised to 12 mths)
Total energy use (MWh)	1,981,547	482,794	2,150,214	2,285,525	4,871,659	2,573,454
Primary energy (MWh)	5,179,327	1,255,264	5,590,557	5,942,365	12,624,168	6,668,717
Electricity used by the IT[7] (MWh)	1,015,360	257,125	1,147,374	1,174,685	2,702,618	1,427,658
IT Primary Energy (MWh)	2,639,936	668,526	2,983,172	3,054,180	7,026,807	3,711,911
CO_{2e} emissions (ktCO2e)	1,040.24	251.44	1,119.84	1,201.21	2,528.29	1,335.57
CCA PUE	1.959	1.878		1.946	1.797	
Sector Commitment		1%			8.333%	
Sector TP target % Improvement		0.95%			8.15%	
Sector Actual % improvement		6.54%			10.24%	

[4] Base Year: All companies participating in the CCA must submit a base year that is 12 months long. At Target Period 2, for data centre companies the actual dates for the base year ranged from 2011 to 2016. The values in this report for Target Period 1 will differ from the previous report due to re-baselining of some base years due to companies correcting their original data.

The sector base year PUE is different at Target Period 2 as this takes into account new entrants to the scheme that have joined during 2015-2016 and also changes to existing base years due to changes such as EU ETS permits being gained during the period. Changes to the sector base year that came into effect during Target Period 2 do not change the result for Target Period 1 as that is still measured against how the base year looked at that time.

[5] Target Period 1: As all sites in the data centre sector started their CCA quite a way into the first target period of 2013-2014, the target period measure for data centres was from the date the CCA started to the end of December 2014. i.e. if a CCA was signed by a company on 1 October 2014 then their target period was from 1 October to 31 December 2014. The table above shows the actual raw data reported for the various target period time periods (which range from 62 to 126 days), plus, the target period data annualised to allow for direct comparison against the base year.

[6] Target Period 2: A number of new entrants joined the scheme during Target Period 2. New entrants report data only from the date that their CCA becomes active, meaning that some facilities did not report data for a full two year period. In the same manner as for Target Period 1, this data has been normalised to provide a 12 month comparison against both the base year and the Target Period 1 normalised data.

[7] Electricity used by the IT means electricity used by the servers and other IT equipment.

Evaluating performance

There are various ways to evaluate the sector's performance and these are presented in the table below.

(A) Absolute change in CO2e emissions

- Total CO_{2e} emissions for all sites in their respective 12 month base years = 1,201.21
- Total CO_{2e} emissions for all sites during their Target Period all normalised to 12 months for direct comparison = 1,335.57

Hence absolute emissions have increased by 11.19% since the base year. This is to be expected given that the IT energy increased by 21.54% over that period.

(B) Change in PUE

- The PUE of the sector in the base year was 1.95.
- The PUE of the sector in the target period was 1.80.

The PUE reduced by 0.15 between the base year and target period; a 7.66% reduction.

(C) Applying a 'NOVEM adjustment' at Target Unit level

This is the Government's preferred approach and features in the Environment Agency's 'biennial report'. In 'simplistic' terms they look at what each target unit would have used in the base year if it had been at the same levels of IT energy use during the target period. Then add up all the 'revised' target unit base year energy usages to give a new sector baseline energy use and compare it against the actual energy used for the target period.

Confused?! Yes so were we! The example below hopefully shines some light on this approach.

For a Target Unit:

Base Year CCA PUE = 1.5

Target Period IT Energy (in primary energy) = 2,000 MWh

The Base Year energy use would have been (1.5 x 2,000) MWh if the IT energy had been 2,000 MWh in the base year = 3,500 MWh.

If the actual energy used during the target period was 3,400 MWh then they had lowered their energy by 100MWh which is a 2.85% reduction.

Applying this method for data centres shows a reduction of 10.24% in energy use by the sector in Target Period 2.

After reviewing the various methods, we can conclude:

- we are a growing sector and hence our absolute CO_{2e} emissions are increasing. However:
- we are becoming more efficient in using our energy as the two methods; (B) and (C), for measuring improvements in energy efficiency show both are improving.

How the population performed at Target Period 2

The table below presents how each target unit (site or collection of sites under one operator) performed at Target Period 2.

	Passing	Failing
Number of Target Units	27	27
Tonnes of CO_{2e}	Banked: 144,464	Bought: 82,353
Buy-out £k	n/a	£988k

If a target unit passes its target then it has reduced its PUE to below what it needed to. It automatically retains the entitlement to claim the Climate Change Levy (CCL) discount and continue to exempt its energy from the Carbon Reduction Commitment (CRC). The table shows that 27 target units surpassed the 8.333% target assigned to them.

If a target unit fails its target then to retain the CCL discount and exemption from CRC it must pay a buy-out fee to compensate for not meeting its target. The table shows that 27 target units were in this position and between them they had to pay approximately £988k in buy-out fees.

So, of the 54 target units that reported, 27 passed and 27 failed, however those that passed their target did so by a greater degree than those that failed, meaning that the sector as a whole exceeded the sector target.

Value of CRC exemption and CCL rebate

In terms of financial benefits, the scheme is providing much needed relief from some of the more punitive non commodity costs currently added to the price of electricity. Across the sector this amounts to £22,582,211 per year. £12,833,331 of that is attributable to CCL discount and £9,748,880 to CRC exemption.

Since changes to the rules regarding EU ETS have exempted all ETS sites from CRC, this figure excludes the CRC exemption conferred by the CCA on to the largest facilities because that has already been accounted for. Were that to be included the total annual benefit to the sector collectively would approach £30M.

It is hard to overstate the value of the CCA to the UK data centre sector. It helps to level the playing field for UK operators trying to compete with counterparts overseas. The CCA also improves the business case for investment in efficiency measures and releases funding that would previously have been allocated to paying carbon taxes so that it can be directed at implementing improvements.

Energy stewardship – the continuing story

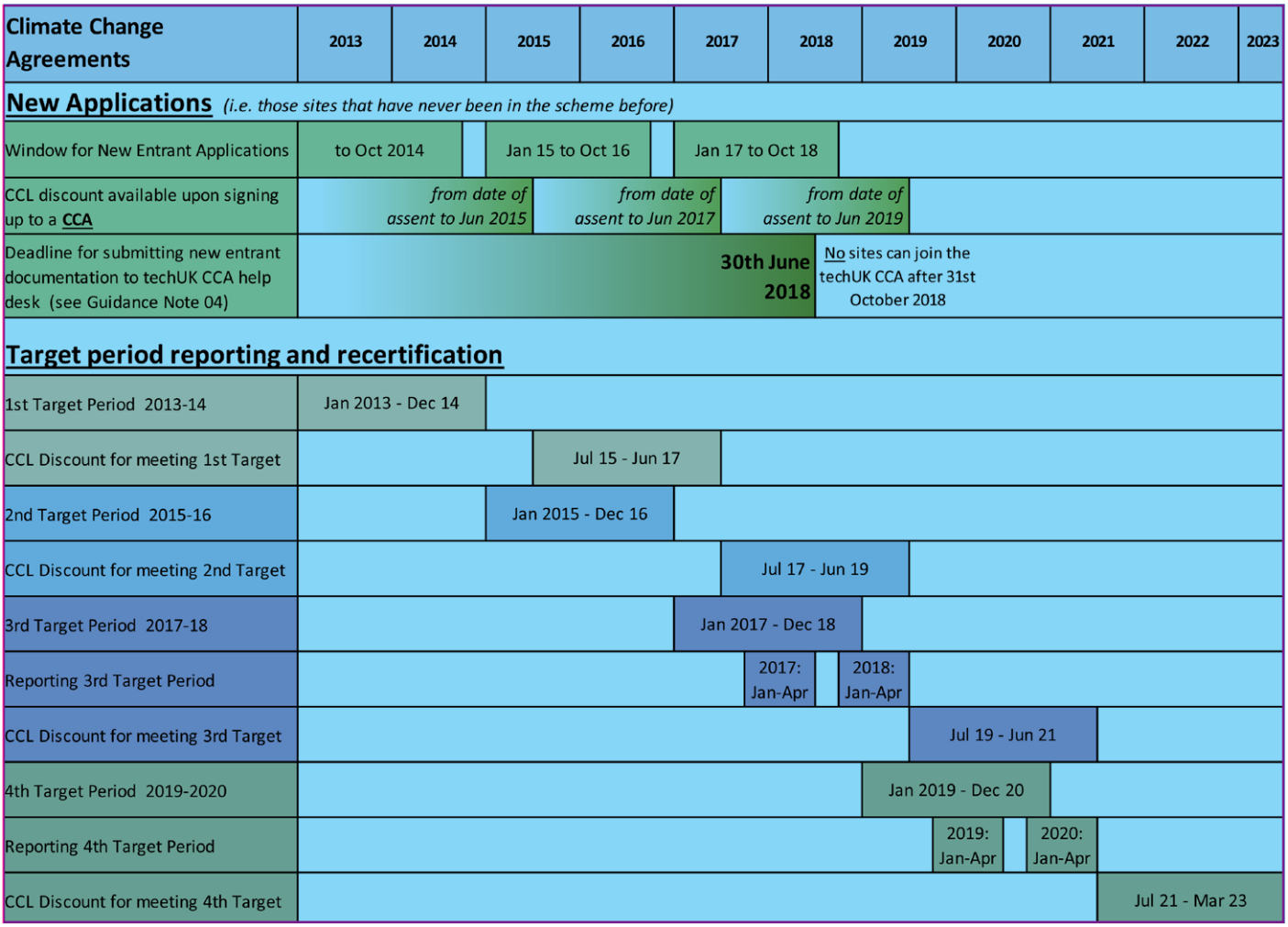
In Section 3 of our report on the first Target Period, we dedicated a whole chapter on how the sector was planning to meet its CCA targets. The improvement in performance we have made during Target Period 2 demonstrates that the sector is actively investing time and money into energy stewardship. No new miracle technologies have been introduced since our last report; therefore we believe the targets set continue to be appropriate and challenging. BEIS agreed with us on this point when they announced in December 2016 that they would not be reviewing targets for TP3 and TP4 in the short term.

III: Looking Ahead: CCA Policy Observations

This section explores the role of the CCA as a policy tool, looks at the timelines up to 2023 and highlights issues for new entrants. It then explores the wider policy landscape and the opportunities that our current circumstances present for simplification in carbon and energy taxation and accounting.

CCA timelines up to 2023 and issues for new entrants

Our last report highlighted how important the CCA is to the UK data centre sector: more than just a tax concession it demonstrates that Government has recognised firstly the existence and secondly the importance of the sector. For those in the scheme it goes part of the way to levelling energy costs and provides a much needed degree of stability that will continue for almost another six years until March 2023. However, looking ahead there is a major cloud on the horizon after October 2018.



[14] https://www.servecentric.com/news-blog/5-reasons-why-ireland-perfect-home-your-it-infrastructure

What is significant about October 2018?

As shown in the diagram, the third target period of the current CCA runs from 1 January 2016 to 31 December 2018. As is usual, no new applications are accepted in the last two months of any target period, so 31 October is the last date that an underlying agreement will be issued by the Environment Agency. In reality, because it can take a few months to process an application, especially if it is complex, new applications will need to be in by June 2018 to be sure of meeting the October deadline. The problem is that the door will not reopen for applications during the fourth and final target period and therefore no new sites will be accepted into the scheme up until it ends in 2023.

For mature industrial sectors that are not growing actively, or long established oligarchic industries where there is little change, this may not present an issue. However, the data centre sector is growing rapidly and new facilities are coming on line all the time. The list below provides an indication of recent and projected sector growth.

Major new UK facilities just entering the market or in development but not yet operational include:

- Colt – Welwyn
- Digital Realty – London
- Etix Everywhere – Edinburgh
- Equinix – Slough
- Google – London
- Gyron – Hemel Hempstead
- IBM (2) - London
- Indectron – Gloucester
- Infinity – East London
- Kao – Harlow
- OVH – South East London
- Telehouse North 2 - Docklands
- Telehouse – Docklands
- TH Real Estate - London
- Virtus – London
- Zenium - Slough and Stockley Park

In effect this means that new facilities and operators like these will be unable to access CCL rebate for up to five years while their competitors continue to benefit from the CCA discount. Existing operators planning to develop new sites or expand campus operations will also be unable to claim discount unless the expansion sits within the boundaries indicated on site plans that were submitted and approved for existing underlying agreements. This will discourage new entrants to the market and place them at competitive disadvantage compared to the incumbents.

We would like to see an urgent review of the current approach.

New reporting frameworks for energy and carbon

The wider regulatory landscape for carbon and energy taxation and reporting could be poised for major change and this presents a really significant opportunity for improvement. Brexit and the demise of measures like the CRC in 2019 provide a combined catalyst for a full scale review of the way that we tax and account for carbon and how we choose to drive improvements in business energy efficiency. Our current frameworks are duplicative, complex and unnecessarily burdensome. Some elements are even dysfunctional, creating perverse incentives or depriving operators of the funding they need to invest in efficiency measures. CRC has already been earmarked for abolition but tools like EU ETS applied in a data centre context continue to add very significant operational costs while performing no useful function.

Treasury proposals to simplify energy taxes are therefore extremely welcome and it is evident that serious consideration is already being given to future models. In addition, and more recently, BEIS has initiated an independent review to ensure that energy costs are affordable for business and aims to make them the lowest in Europe. There has also been a commitment to learn from the inward investment strategies of other nation states and these frequently include energy cost concessions for data centres. The data centre sector is happy to contribute to this dialogue.

The Government has a blank sheet in this area, and a unique opportunity to design a simpler, more functional system. When this opportunity can be seized, however, is a different matter. For civil servants and MPs, Brexit is currently the priority and they are understandably reluctant to create new schemes and legislation unless absolutely necessary. So in reality we might have to 'make do and mend' for a few more years.

Opportunities for change: what would "good" look like?

Considering the comments made above about the pace of change that is likely, we identify three priorities that are realistic and could be implemented quickly without the need for major change:

1) **CCAs would be extended for another ten years and hence the hiatus on accepting new entrants post 2018 would be removed:** Given current political instability and perceived preference of civil servants to avoid unnecessary new legislation or schemes, CCAs continue to present a pragmatic solution: a policy instrument already known, liked and proving effective at delivering carbon reductions. Extending the CCA scheme also allows new sites to continue joining seamlessly at a time when operators really need strong signals of support.

2) **The data centre sector would be eligible for the same compensation as other sectors:** The CCA can only address a fraction of the non-commodity costs that burden electro-intensive industries. The data centre sector should be eligible for these concessions so that UK operators can compete with overseas counterparts (see Section IV, on energy costs).

3) **The sector would not be captured by EU ETS at all and all our emissions would sit within the CCA:** EU ETS is too much of an administrative burden in proportion to the size of the scope 1 emissions generatred by data centres. Compliance costs dwarf allowance costs by up to 100:1, and we learn nothing new because the same information is already captured elsewhere. Worse, it takes resources away from tangible activity to reduce emissions. Instead operators are forced to focus on filling in paperwork and authenticating the fact that a very small amount of CO_2 is indeed a very small amount of CO_2. It is equivalent to charging people £30,000 to check that their £100 tax bill is correct and then exhorting them to spend money more wisely.

IV: Why do Energy Costs Matter?

This section explains why high energy costs are so problematic for the UK data centre sector.

Data centres are important

UK data centre operators need strong signals of support from Government because they are energy intensive, because they are highly vulnerable to overseas competition (they produce the most mobile commodity on earth), and because they are critically important to the UK economy. The UK data centre sector is globally important and protecting it should be at the very top of our priority list.

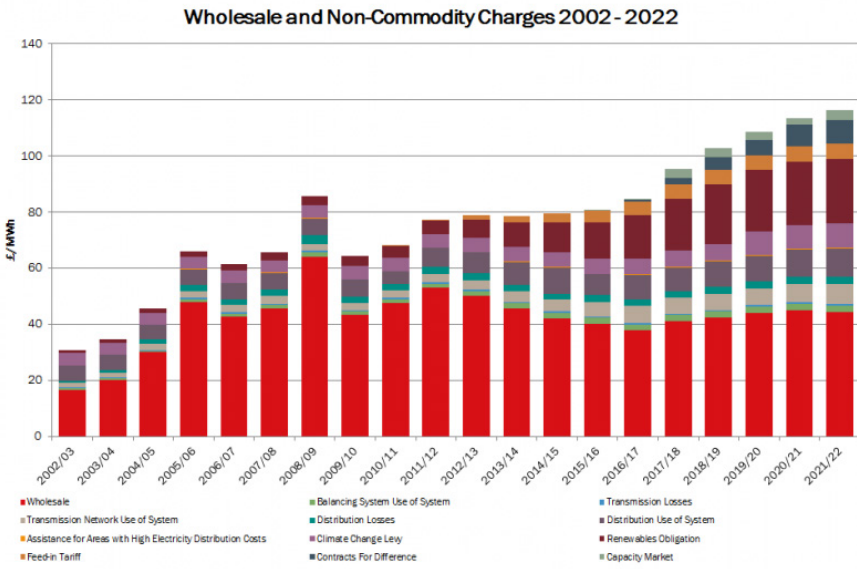
Data centres underpin the digital economy; they are engines of growth and they improve productivity and generate employment across multiple business sectors. Building and operating a data centre is an advanced commercial engineering project; it depends on a complex and specialist supply chain and drives a demand for professional services and high value-add engineering and technical jobs. But that is just the supply chain: once in operation, a data centre is essentially a platform that enables a multitude of different business activities to function simultaneously, and can therefore facilitate an astonishing range of offerings from web-hosting to computer aided design. In this way a single data centre supports multiple levels of economic activity.

Electricity prices: Non commodity costs

In our last report we took a close look at electricity costs and their impact on the competitiveness of the UK sector. We also looked at the initiatives that other countries are taking to protect the competitiveness of their data centre markets from high energy costs (see Annexe 1). This might on the one hand strike fear into our own inward investment teams or on the other hand inspire them to provide a similarly inviting environment for data centre operators to locate, flourish and expand.

This time we will focus on non-commodity costs. Energy prices in the UK are made up of commodity and non-commodity costs. Non commodity costs, or third party charges, include network charges and a variety of taxes and levies. Network charges cover transmission system costs, distribution network costs, balancing services and assistance for areas with high distribution costs[8]. Taxes and levies on electricity (with the exception of the CRC[9] which contributes to general tax revenues) are paid by consumers to fund our renewables programme[10] and include the Renewables Obligation (RO), Feed in Tariffs (FiT), the Capacity Market (CM), Contracts for Difference (CFD) and the Climate Change Levy (CCL). These are collected in six different ways, by five different authorities[11] and are billed inconsistently - depending on supplier and contractual arrangements.

Non commodity charges currently account for around 50% of the price of electricity (see Fig 1) and the proportion of these charges is set to rise by around 30% between 2017 and 2019 as the impacts of the CfD and CM start to be felt.



Source: Utilitywise, November 2016

[8] TNUoS: Transmission Network Use of System; DNUoS- Distribution Network Use of System, BSUoS – Balancing Service Use of System; AHHEDC – Assistance for Areas with High Electricity Distribution Costs.

[9] Carbon Reduction Commitment Energy Efficiency Scheme, due to end in April 2019

[10] , which has already delivered a substantial improvement on the carbon intensity of grid power on which we are making good progress: the carbon intensity of a KWh has dropped from over 700g to 420 g over the last ten years

[11] CRC is BEIS / Environment Agency, RO is via the market or Ofgem, FITs is Ofgem, CFDs are Low Carbon Contracts Company, CM is Electricity Settlements Company and CCL is HMRC

Observations from operators

Operators are very concerned by the growing electricity price gap between the UK and competing markets. They make the following observations:

- High energy costs are severely challenging the competitiveness of commercial data centre operators in the UK and are presenting obstacles to inward investment and sector expansion.

- Other countries, within and outside Europe, are aggressively marketing their credentials as locations of choice for data centre operators in preference to the UK. Energy cost is a primary bargaining chip.

- The UK data centre sector is one of our national success stories and considered to be the fastest growing sector in the developed world, driven by increased digitisation and demand for data.The sector underpins the digital economy, smart grid, superfast broadband and drives infrastructure improvements and high tech clustering. It is an agent of growth[12] .

- Data is the most mobile commodity on earth and as a result data centre services are vulnerable to offshoring, which in turn may lead to carbon leakage.

- Whilst the sector does benefit from welcome relief on CRC and CCL through a CCA, this only addresses a fraction of the burden (see diagram above).

- The sector is not officially classified as electro intensive, despite being more energy intensive than some qualifying industries. As a result the sector does not receive compensation for the cost of renewables and moreover, has to share the additional costs imposed on other industrial energy users who shoulder the burden of those compensation measures.

- Current compensation measures are limited to certain manufacturing industries and the focus seems to be on preventing decline rather than protecting growth. No service sectors currently qualify for relief.

- Limited routes to mitigate some of these costs through triad avoidance or demand side response are unavailable to data centre operators due to restrictions imposed by compliance requirements.

- Other countries with competing data centre markets have explicitly exempted their data centre sector from energy taxes or found other ways to reduce energy costs. Most recently Sweden has announced a concession specific to data centres that reduced power costs by around 40%.

What do we need Government to do?

In the light of this, urgent action is needed by Government to ensure that data centres are treated on a par with other energy intensive sectors. The current arrangements, where different qualifying criteria apply to different schemes, are complex, burdensome and inadequate.

Government also needs to take note of initiatives in competing markets that are targeted at attracting inward investment from this sector, many of which relate to energy costs. See Annexe 1 for examples.

There is, undeniably, a degree of perversity in applying charges to energy costs that render intensive energy users uncompetitive and then apply different schemes to provide relief for each charge through a series of rebates and discounts. It would presumably make more sense to follow the examples set by other nation states and exempt sectors at the beginning of the process, saving cost and reducing confusion and complexity.

[24] Understanding, Demystifying and Addressing the UK's Big Data Skills Gap: http://www.techuk.org/insights/reports/item/9469-the-uk-s-big-data-future-mind-the-gap

[25] http://www.britishfuture.org/wp-content/uploads/2016/09/What-next-after-Brexit.pdf

VI: Concluding Thoughts

We share brief thoughts on the broader implications of the CCA.

This report is primarily a progress update on our CCA journey: we have used it to review our performance against our second target and what this tells us about energy stewardship within the sector. However, it has also provided us with an opportunity to make observations on the CCA scheme as a policy tool, explain why the UK data centre sector remains in critical need of this kind of support and urge Government to keep the scheme open to new entrants for as long as possible. We have also commented on the wider regulatory landscape governing business energy efficiency and how that might evolve looking ahead.

So our final conclusions very much echo those of both our previous reports. The CCA is an important milestone for the UK data centre sector because it is more than a tax concession: it is also formal recognition by Government that the data centre sector exists and will be here for the foreseeable future, that it is important and is a significant contributor to the UK economy, to growth and jobs.

The CCA scheme is not perfect and it has several limitations. One is that the incentive is not sufficient to drive investment in the really big ticket items with payback over three years, and supplementary incentives such as enhanced capital allowances or zero interest loans (as provided under the ETL) might help here. Secondly, while the CCA target is correctly focused on energy productivity, it works best when the level of industrial activity is relatively stable. To some extent meeting the target is dependent on “throughput”. Operators who lose customers or whose throughput diminishes for some other reason will struggle to meet their targets, irrespective of the efficiency measures they put in place, and in some cases the opposite can also be true.

Nevertheless, the advantages of our CCA massively outweigh its shortcomings. In addition to the obvious financial benefits the scheme stimulates greater investor confidence, an enhanced understanding of energy stewardship and invaluable data on aggregate energy use. With data centres now firmly on the policy radar it also provides a conduit for constructive policy dialogue going forward.

We now need to build on this. While we would like to see a complete rationalisation of carbon and energy taxation and accounting frameworks and a move to exemptions at source, we accept that policy makers have other pressing priorities just now. In the short term, however, there are some immediate actions that Government could take that would improve confidence and competitiveness. Firstly the CCA scheme should be extended and the moratorium on new entrants from 2018 lifted. Secondly Government must ensure that the sector is adequately protected from escalating energy costs. The imminent increase in non-commodity costs will be particularly problematic for data centre operators, who should be eligible for the same compensation as other electro-intensive industries. Thirdly, data centres should be exempted from EU ETS.

Treasury has recently demonstrated a willingness to streamline the multitude of carbon taxes and reporting regimes, which will provide welcome clarity and reduce compliance burdens, and now BEIS has announced its objective to make UK energy costs the cheapest in Europe. If that can be achieved it will make a material difference to the competitiveness of this critical sector and help to secure its future. In the meantime, the CCA continues to provide some much needed stability in a disconcertingly volatile policy landscape.

Annexe 1: Inward Investment examples

What are other countries doing?

Although the UK's data centre market is the largest and best developed in Europe, other countries are not sitting around idly. Within Europe, nation states are competing fiercely for inward investment, some are providing tax breaks and other discounts on energy, some are investing in connectivity and all are rolling out a range of other incentives. A few examples are listed below.

Ireland: Incentives include: low corporate tax of 12.5% and plans to halve that for revenue pegged to patents and intellectual property; ACA (Accelerated Capital Allowance) Scheme; a tax incentive that aims to encourage investment in energy saving technologies (companies can write off 100% of the purchase price of registered energy efficient equipment against their profit in the year of purchase). IDA (Industrial Development Authority) Grant Scheme; Government agency encouraging foreign direct investment into Ireland through grants, e.g. €10k/ employee hired for up to 10 years. Retrofit Grant; Sustainable Energy Ireland is steering a bill through Government to enable organisations to receive grants for retro-fitting energy hungry environments.

Sweden: Fast track planning process enabling the approval of planning permission within weeks rather than months. A regional data centre strategy that includes education, research and other supporting activities for growth in energy-efficient data centre establishments, e.g. a 2MW research and test environment for data centres funded by local Government. Investment subsidies are available in certain areas). In 2017 an energy concession reduced power costs by 40%.

Iceland: Iceland offers low corporate tax but the primary attractant is power that is priced among the lowest in the world, available in up to 20 year contracts. Iceland's electrical grid is regularly ranked among the top three in the world for reliability. All power is sustainable - dual sourced from geothermal and hydroelectric. New direct investment projects can apply for an investment agreement, ensuring generous regional incentives. General incentives for SMEs, R&D and environmental protection are also available.

Germany: Germany's high internet bandwidth capacity, low perceived risks, its low rate of inflation and stable political system contribute to the country's attractiveness when choosing a data centre location. Companies can qualify for 90% relief on energy taxes if they have an energy management system in place such as ISO 50001 or EMAS and companies documenting improvements can benefit from simpler measures.

Netherlands: The third biggest European market, the Netherlands has significantly lower electricity costs and operates a system of 'Long Term Agreements' (loosely equivalent to CCAs) that are aimed at promoting energy savings in certain industries.

Luxembourg: In recent years, Luxembourg has made huge investments into connectivity and now boasts high speed low latency connections to all of the major European Internet hubs – Amsterdam, Frankfurt, London and Paris through a wide choice of fibre optic providers.

Annexe 2: Target Unit Results

Table based on calculations (EA Target Period 2 official report is not due until October 2017)

TU Identifier	Operator Name	CCA emissions tCO_{2e}	Target passed?	Buy-out purchased?
DATC/T00025	Ark Data Centres Limited	18,793.19	Y	N
DATC/T00028	Ark Data Centres Limited	17,791.58	Y	N
DATC/T00045	Atos IT Services UK Limited	32,554.23	N	Y
DATC/T00004	CenturyLink Technology UK Limited	74,728.48	Y	N
DATC/T00048	Cogeco Peer 1 (UK) Ltd	7,921.66	Y	N
DATC/T00027	Colt Data Centre Services UK Ltd	94,639.13	Y	N
DATC/T00032	CSC Computer Sciences Ltd	70,624.28	N	Y
DATC/T00056	Databanx Limited	1,470.62	Y	N
DATC/T00017	DataBanx Limited	1,436.36	N	Y
DATC/T00018	DataBanx Limited	9,197.93	N	Y
DATC/T00019	DataBanx Limited	1,186.57	Y	N
DATC/T00052	Datum DataCentres Limited	1,888.31	Y	N
DATC/T00054	Digital London Limited	84,478.02	N	Y
DATC/T00003	Digital Realty (UK) Limited	334,297.23	Y	N
DATC/T00053	Eduserv	1,208.68	N	Y
DATC/T00010	Enfield DC Service Company Ltd	18,483.40	Y	N
DATC/T00011	Equinix (UK) Ltd	239,962.06	Y	N
DATC/T00040	Everest Data Centres Ltd	8,459.36	N	Y
DATC/T00030	Fujitsu Services Limited	64,202.03	Y	N
DATC/T00005	Global Switch Ltd	250,362.05	N	Y
DATC/T00015	Gyron Internet Ltd	61,651.66	Y	N
DATC/T00026	IBM United Kingdom Limited	32,692.57	N	Y
DATC/T00022	IBM United Kingdom Limited	38,848.60	N	Y
DATC/T00023	IBM United Kingdom Limited	41,929.63	Y	N
DATC/T00047	Interoute Communications Limited	4,635.97	N	Y
DATC/T00039	Interxion Carrier Hotel Ltd	57,285.80	Y	N
DATC/T00014	Iomart Hostings Ltd	45,492.92	Y	N
DATC/T00055	ISDC Developments (No 2) Limited	3,281.20	Y	N
DATC/T00041	Knowledge Ltd	2,558.12	N	Y
DATC/T00021	Level 3 Communications UK Ltd	79,346.42	N	Y
DATC/T00001	NEXT GENERATION DATA LIMITED	29,172.37	Y	N
DATC/T00049	Node4 Limited	14,226.91	N	Y
DATC/T00012	Pulsant Limited	60,733.27	Y	N
DATC/T00043	Rackspace Ltd	61,623.43	Y	N
DATC/T00002	Six Degrees Technology Group Limited	17,330.54	N	Y
DATC/T00046	Specialist Computer Centres Plc	15,538.57	Y	N
DATC/T00006	Sungard Availability Services (UK) Limited	88,297.26	N	Y
DATC/T00034	Talk Talk Group	7,906.93	N	Y
DATC/T00035	Talk Talk Group	6,301.16	Y	N
DATC/T00036	Talk Talk Group	5,719.08	N	Y
DATC/T00037	Talk Talk Group	371.66	N	Y
DATC/T00038	Talk Talk Group	3,153.48	N	Y
DATC/T00057	TalkTalk Telecom Group Plc	2,316.38	Y	N
DATC/T00007	TATA Communications (UK) Ltd	18,060.51	N	Y
DATC/T00013	TelecityGroup UK Ltd	141,367.50	Y	N
DATC/T00031	Telehouse International Ltd	139,182.64	N	Y
DATC/T00029	Telstra Limited	32,218.65	Y	N
DATC/T00050	The Bunker Secure Hosting Ltd	3,863.03	N	Y
DATC/T00008	Unisys Limited	11,669.18	N	Y
DATC/T00051	Virtus Hayes Ltd	6,537.21	Y	N
DATC/T00058	Vocalink Limited	1,238.61	N	Y
DATC/T00009	Vodafone Ltd	152,694.72	N	Y
DATC/T00044	Volta Datacentres Ltd	3,718.68	Y	N
DATC/T00042	Zen Internet Ltd	3,644.99	N	Y

Further information

About techUK's data centres programme

techUK is proud to represent the UK data centre sector and offers a comprehensive and influential programme of activity. Our objective is to ensure that the UK continues to offer a business and regulatory environment in which the sector can flourish. We specialise in matters relating to public policy, regulation, reputation, professionalism and energy efficiency.

techUK Data Centres Council: techUK's Data Centres Council was established in 2009 as the UK Council of Data Centre Operators and is a decision making body that sets strategic direction, defines the outputs that techUK will develop on behalf of the sector and agrees the level of our external stakeholder engagement. The Council is chaired by Andrew Jay of CBRE and the vice chair is Rob Coupland of Digital Realty. The Council is supported by a Technical Committee, chaired by Professor Ian Bitterlin with Mark Acton as vice chair, which provides expert technical input.

techUK Data Centres Group: Our data centre interest group comprises over 400 members from across the industry. These include data centre operators (both colocation and enterprise providers) companies who manufacture the IT and communications hardware that occupy these facilities, those in the data centre supply chain, and customers, who either lease space for their own corporate function or sell services from the data centre. Specialist activities are devolved to sub-groups.

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Links

Data Centre CCA Information: http://www.techuk.org/focus/programmes/data-centres/cca

Data centre programme pages: www.techuk.org/datacentres

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